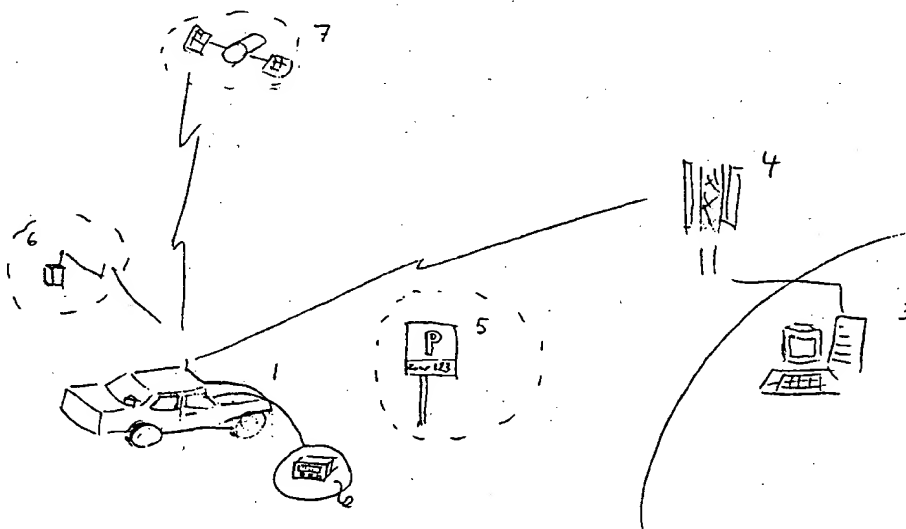




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(54) Title: METHOD AND SYSTEM FOR COLLECTING PARKING FEES



## (57) Abstract

A parking system for registration of pay parking is described. The system consists of a plurality of vehicle terminals and at least one payment centre. When parking begins a signal is transmitted from the vehicle terminal, which is installed in a vehicle, to the payment centre. The payment centre records the duration of parking until it again receives a signal from the vehicle terminal that parking has been terminated. The vehicle terminal is designed to give an indication which is visible from the outside of the vehicle that parking has been registered. In a preferred embodiment the mobile telephone network is employed for communication between vehicle terminal and payment center, thus enabling the payment centre to administer car parks over an area which is limited only by the mobile telephone system's coverage area, and geographical data for a registration call can be retrieved from the mobile telephone network (e.g. GSM).

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### Method and system for collecting parking fees

The present invention relates to a coin-free parking system based on cordless registration of when parking of a vehicle begins and ends. The system can easily be combined with existing cordless communication networks such as the mobile telephone network, but it will also be possible to implement it by means of systems which are specially designed for the purpose. It should also be pointed out that by the mobile telephone network we are referring to any cordless telephone system, both present and future, and systems based on both local base stations and on satellites.

Present day parking systems in towns, both public and private, are usually based on ticket machines and parking meters which require insertion of coins. There are a number of weaknesses and drawbacks involved in this system, such as, for example, substantial purchasing and maintenance costs, considerable mechanical alterations when new coins are issued, resource-demanding and sometimes risky money collection routines, as well as loss of income in the event of mechanical breakdown.

At the present time most pay parking systems work as follows; the person who wishes to use a pay car park must first find the nearest parking machine, he must have the correct payment means at hand, usually coins, and often he has to know in advance exactly for how long he will be parked, if the whole parking period has to be paid in advance. After having paid he normally has to return to the vehicle in order to place a parking token, a ticket or other form of proof of payment in the vehicle, in such a manner that it is visible to parking attendants.

In contrast to this the present invention is based on a cordless vehicle terminal. This is capable of communicating with a payment centre, for example, via the mobile telephone network or via other cordless communication systems, either by being equipped with its own transmitter/receiver, or by being physically or cordlessly connected to an external communication unit, such as a mobile telephone.

A previously known parking system which employs cordless communication with a payment centre is known from the publication WO 93/20539. This system describes how a vehicle is registered in a central database at the beginning and end of the parking period. However, no efficient method of

checking parked vehicles is described herein. A parking attendant has to be equipped with a portable computer which has access to the said database in order to find out which vehicles are legally registered in the database.

A similar system is described in WO 96/11453.

5 Swedish patent SE-C2-507.240, which is basically a system for payment of road licenses, is also adapted for use in payment of parking fees. The system comprises a unit which is installed in the vehicle and which can be activated by means of a push button at the beginning of a parking period. The unit  
10 comprises a GSM mobile telephone, and on activation of the unit when parking a message is transferred by means thereof concerning the start of parking to a traffic and parking register. Information concerning the vehicle is stored in the unit's SIM card. A special feature of this publication is the proposal that the information should be transferred not by means of a dial-up connection, but only by recording in which traffic area of the GSM network  
15 the vehicle unit is registered. All GSM telephones which are outside their home area will be registered in a so-called Visitor Location Register (VLR), and when the GSM telephone is a vehicle unit according to this publication, this register will pass this registration on to a special traffic and parking fee register (TPFR). It further describes how this system can utilise a further  
20 division of the traffic area, down to the GSM network's cellular level, by means of an exchange of Short Message Service (SMS) messages between the GSM network and the mobile telephone unit. A check on whether parking is legally registered has to be performed by an automatic (for example  
25 registration of the vehicle's registration number by means of a surveillance camera and picture analysis) or a manual check on whether the vehicle is registered in the fee register.

Swedish patent SE-C2-507.381 is based on the above-mentioned publication and describes a system for debiting of parking fees. This system employs a regular GSM mobile telephone. This system too is based on any checks being  
30 performed by a parking attendant is done by look in a data base.

The above-mentioned problems associated with traditional means of collecting parking fees by means of coin machines and the like are overcome by the various systems described in the above-mentioned publications at the cost of new drawbacks and problems, particularly where a parking attendant

has to check parked vehicles by referring to a database or by checking parked vehicles against a print out from such a database. It may be necessary to introduce sophisticated systems for automatic recognition of vehicles and subsequent reference to said database.

- 5 By means of the present invention, however, said problems are overcome without introducing new drawbacks and costs for the operator of the parking system. This is achieved by means of the characterising features which are set forth in the independent claims.

10 According to the present invention, when the vehicle is parked a connection is established between the vehicle terminal and the payment centre. The vehicle terminal registers the parking and receives a confirmation that parking has been registered. In one possible embodiment, the vehicle terminal on registration indicates how long the parking period will last. In an alternative embodiment the point in time when parking starts is registered in  
15 the payment centre, and a new connection is established between the vehicle terminal and the payment centre at the end of the parking period, the point in time again being registered. In a third embodiment the vehicle terminal comprises a timer which is started at the beginning of the parking period, and this is read by the payment centre at the end of the parking period. The  
20 payment centre will thereby register how long the vehicle has been parked, and a bill can be sent to the vehicle's owner, for example monthly.

On registration a unique code is transferred to the payment terminal, thus identifying the vehicle and ensuring that the parking fee is charged to the correct person. This code is preferably stored in the vehicle terminal or in a  
25 communication unit connected thereto, for example on a so-called SIM card in a mobile telephone.

The confirmation which the vehicle terminal receives from the payment centre will preferably comprise a registration code generated by the payment centre. After having received this code the vehicle terminal will indicate that  
30 parking has been registered, for example in the form of an indicator lamp, but preferably also by exhibiting the received code on a display, which will be visible to an inspector from the outside of the vehicle.

The system according to the present invention will now be described in more detail with reference to the accompanying drawings.

Figure 1 is a principle drawing of how the communication takes place between vehicle and payment terminal in a preferred embodiment of the invention.

Figure 2 illustrates a possible design of the vehicle terminal which is placed in a vehicle which is going to use the parking system according to the invention.

Figures 3a, b illustrate embodiments where the vehicle terminal does not comprise a separate transmitter, but is connected to a communication unit, for example a mobile telephone.

Figure 4 is a flowchart illustrating the steps which are implemented at the beginning of a parking period, according to a preferred embodiment of the invention.

Figure 5 is a flowchart illustrating the steps which are implemented at the termination of a parking period, according to a preferred embodiment of the invention.

Figure 1 illustrates the composition of a parking system according to a preferred embodiment of the invention. A vehicle 1 which is being parked is equipped with a vehicle terminal 2 which is capable of establishing connection with a payment centre 3. In a preferred embodiment the vehicle terminal 2 is capable of communicating via the mobile telephone network 4, for example GSM or a satellite-based system, and the payment centre 3 is connected to the public telecommunication network. The vehicle terminal 2 may either comprise a built-in transmitter which is capable of making calls and communicating via the mobile telephone network (fig. 2), or it may be designed so that it can be connected to a mobile telephone or another transmitter via a communication port (fig. 3). Such communication ports now exist on most mobile telephones in the form of physical connections or infrared transmitters and receivers. Other cordless connections will appear in the future, for example the specification which is under development under the name Bluetooth. The payment centre can be operated by the telephone operator, with the result that the bills for parking are sent together with the telephone bill, but it may also be operated by an independent parking company.

When a user of the parking system parks his vehicle 1, he activates the vehicle terminal 2 in the vehicle 1. This, or the mobile telephone or transmitter to which it is connected (fig. 3) will then call the payment centre 3 for registration in the form of a code which identifies the vehicle 1 or the user. In a preferred embodiment the parking system is closely connected to the mobile telephone network, for example GSM. In this case it will be possible for the code which identifies the user to be the same as the signal which identifies the mobile telephone to the mobile telephone network, and this will be able to be transferred to the payment centre in the form of the mobile telephone's telephone number, as is usual in teleservices of the type "Caller ID". The payment centre 3 will also be able to handle several geographical areas and with a closer integration with the mobile telephone network the payment centre will be able to register the vehicle's position by means of the mobile telephone network's ability to determine where a mobile telephone is located. This information will be found in the mobile telephone network's location registers (Home Location Register - HLR, Visitor Location Register - VLR). It may also be possible to register with which cell (base station) in the mobile telephone network the mobile telephone is communicating. If the geographical area concerned includes zones with differentiated parking fees and/or parking areas which are run by different parking companies, or if the functionality of the mobile telephone network is not utilised in this respect, the vehicle terminal in the vehicle can be designed in such a manner that the user can key in where he is located (fig. 2), for example based on information which can be found on signs in the car park 5. If the vehicle terminal 2 is designed to communicate via a standard mobile telephone the mobile telephone's keys may also be used for this purpose. A possible design of a terminal with built-in mobile telephone or transmitter is illustrated in figure 2.

In an alternative embodiment, signals 6 will be transmitted at the individual car park which identify the car park and which can be picked up by a receiver disposed in the vehicle terminal 2. It will then transfer these signals together with the vehicle's identification code to the payment centre. In this case the user himself does not need to indicate what kind of zone or parking area he is parked in.

In a further alternative embodiment the vehicle terminal is equipped with a receiver for GPS signals (Global Positioning System) for determining

position, and it will then be this position which is transferred to the payment centre 3. An embodiment of this kind will preferably be suited for parking which takes place outdoors, since the GPS signals 7 might be difficult to receive in an indoor car park or in a garage.

5 In figure 1 the different alternatives for indication of parking area or position are surrounded by broken lines in order to indicate that they are alternatives which may form part of a system which employs the method according to the invention, but that this will be dependent on which implementation of the system is chosen.

10 A simpler embodiment may of course also be implemented within the scope of the invention, for example in the form of a local payment centre which only registers parking in a single car park, and which communicates directly with the vehicle terminals 2 in the vehicles 1, for example by means of radio signals.

15 Figure 2 illustrates how a vehicle terminal 2 may be designed. The terminal 2 will at least comprise an activating key for registering the start of parking 10, a signal output unit - such as a built-in radio transmitter or mobile telephone and an antenna 11 - for transferring signals between the terminal 2 and the payment centre 3, and an indicator 12 which indicates that the terminal has  
20 been registered, for example in the form of a flashing green lamp. The output unit may also be a communication port or an infrared transmitter/receiver for connecting the terminal to an external communication unit, such as a mobile telephone, as will be explained below in connection with figure 3.

In the case where the system is designed to handle parking in different zones  
25 with different fees or parking areas belonging to different parking companies, it will be possible to furnish the terminal with keys 10 for indicating where it is parked. In this case, on activation the vehicle's identity as well as the number of the parking area will be transferred to the payment centre 3. This starts a time registration connected to the indicated vehicle or user identity  
30 and returns a confirmation to the vehicle terminal 2. This confirmation preferably includes a registration code which is generated by the payment centre 3. The vehicle terminal 2 may include a timer which is started on registration and which can be read by the payment centre 3 when parking is terminated.



The vehicle terminal 2 will show that it has received confirmation from the payment centre, for example in the form of a flashing green lamp 12.

Moreover, the terminal will preferably be designed with a display 13, which amongst other things can indicate in which parking area it is registered that the vehicle is parked. Instead of or in addition to a green lamp 12 the vehicle terminal may also be designed to indicate on the display 13 the registration code which is received from the payment centre, or a code which is derived therefrom, with the result that a parking inspector can be assured that the registration is valid. The terminal 2 should preferably be installed in such a manner that a parking attendant can see it and can confirm that registration has been performed and that the correct parking area is indicated.

When this exchange of information between terminal 2 and payment centre 3 has taken place, the connection is closed down. In a preferred embodiment the display 13 will also indicate how long it is since parking was registered. By this means a parking attendant will also be able to find out whether a vehicle has been left in the car park longer than is permitted at the individual location.

In a preferred embodiment a user who returns to his vehicle 1 will reactivate the vehicle terminal 2. This will again call the payment centre 3 and transfer a signal which again indicates the vehicle's or user's identity and/or the registration code which was received at the start of parking, and that parking is to be terminated. After receiving this signal the payment centre 3 will check that the indicated parking has actually been recorded. If this is not the case, an error message will be returned to the vehicle terminal. Otherwise the payment centre 3 will record that parking is terminated and that the registration of parking time should cease. In an alternative embodiment the terminal 2 is so designed that the user can indicate in advance how long the parking period will last. This will then be recorded either in the terminal 2 or in the centre 3, or in both. The unit which has stored this registration will then, after the predetermined period has passed, automatically establish a connection between payment centre 3 and vehicle terminal 2 (i.e. either the terminal 2 calls up the payment centre 3, or the payment centre 3 calls up the vehicle terminal 2 concerned), and the time registration in the centre 3 and possibly in the vehicle terminal 2 is terminated, while at the same time the vehicle terminal 2 ceases to indicate that parking is recorded, e.g. by the green lamp 12 ceasing to flash and/or the information which is shown in the

display 13 being altered. An alternative which requires automatic establishment of a connection between the vehicle terminal 2 and the payment centre 3 assumes that the vehicle terminal 2 is capable at all times of communicating with the payment centre 3 (i.e. a solution as illustrated in figure 2 and not as in figure 3). If the parking time is recorded both in the payment centre 3 and in the vehicle terminal 2, it is not necessary to establish the connection after the expiry of the parking period. In this case the parking period will already be registered in the payment centre 3, and the vehicle terminal 2 may include a timer which switches off the indication 12 that parking has been registered. It is possible, of course, to design the system to cover both alternatives, and accordingly the user himself can choose whether he wishes to indicate beforehand how long parking will last or whether he wishes to terminate the parking registration when he returns to the vehicle 1.

The terminal may be designed with an additional lamp 14 which indicates that the parking registration has ceased, e.g. in the form of a flashing red light. This will be advantageous, for example, if different car parks in the same parking area feature free parking from different times in the evening. A user will be able to indicate that parking should only be paid for up to, e.g., six o'clock in the evening even though the payment centre 3 is designed to record parking up to eight o'clock in the parking area concerned.

Figures 3a and 3b illustrate two possible embodiments where the vehicle terminal 2 is connected to a communication unit 20 or via a physical connection 21 (fig. 3a) and via a cordless connection 22 (fig. 3b), such as for example infrared or Bluetooth. A number of such solutions are known, for example for connecting mobile telephones and portable computers, and in principle any solution of this kind can be adapted for use in the present invention. In the preferred case that the communication unit 20 is a mobile telephone the producer will normally have equipped this with a communication solution of this kind, which will then be employed for connecting the mobile telephone to the vehicle terminal 2.

The flowchart in figure 4 illustrates the steps which are implemented at the beginning of parking according to a preferred embodiment of the invention.

In this embodiment the user initiates parking by means of the user interface on the actual vehicle terminal 2. It is assumed that a connection is first

established between the communication unit 20 and the vehicle terminal 2. How this is done will depend on which of the many solutions which exist in this area is chosen, but it may involve establishing a physical connection, causing infrared transmitters to communicate with each other, Bluetooth communication or the like. It will normally be necessary to activate the communication unit's communication port by means of menu selection on the communication unit 20 which will preferably be a mobile telephone, for example a GSM telephone.

The first step 101 indicates that the user is initiating parking by activating the vehicle terminal 2. The user can then select parking area by means of the function keys 10 on the vehicle terminal 2.

The next step 102 involves the vehicle terminal transmitting the necessary data for registration of parking to the communication unit 20. These data comprise a registration signal with ID, possibly also indication of parking area and/or duration. The vehicle terminal 2 instructs the communication unit 20 to establish connection with the payment centre 3. When this connection has been established, the communication unit 20 transfers said data to the payment centre 3.

In step 103 the data which include the registration signal are received by the payment centre 3. The payment centre 3 checks that the registration signal is a valid registration signal, i.e. that it contains the information which is required for registering parking, such as for example a valid identification code ID. If the data in the signal are not valid, step 105 is performed, which involves the payment centre 3 returning a call-not-accepted signal to the communication unit 20 and on to the vehicle terminal 3. If on the other hand the data are valid, step 106 is performed, where the payment terminal 3 registers the vehicle terminal's identification ID and starting time for parking, possibly also the duration of parking if this was indicated by the user on initiation.

Step 107 is then implemented, where the payment centre returns a confirmation that parking has been registered to the communication unit 20 and on to the vehicle terminal 2. This confirmation may include a registration code which is generated by the payment centre.

In step 108 an indication is activated on the vehicle terminal indicating registration of parking in the payment centre. This may be indicated, for example, by an indicator lamp, or by displaying the registration code from step 107 in a display 13. The established connections are then disconnected.

- 5 The flowchart in figure 5 illustrates the steps which are implemented at the termination of a parking period, according to a preferred embodiment of the invention.

The user first re-establishes a connection between the vehicle terminal 2 and the communication unit 20 as described above.

- 10 The user then indicates by means of step 201 that parking is to be terminated by activating the vehicle terminal 2. This is implemented by pressing the function key 10 concerned on the vehicle terminal 2. Alternatively, the vehicle terminal may be designed in such a way that it automatically initiates registration of terminated parking by starting the vehicle. The vehicle  
15 terminal 2 will instruct the communication unit 20 to establish connection with the payment centre 3. In step 202 the vehicle terminal transmits a signal indicating that parking is to be terminated. The signal comprises an identification of the vehicle terminal ID. The signal is transferred to the payment centre 3 as described above.
- 20 In step 203 the payment terminal checks whether the received ID agrees with a parking which is already registered. If the ID is not correct, i.e. if no already initiated parking has been recorded for the vehicle terminal in question, step 205 is implemented, where the payment terminal sends an error message to the vehicle terminal 2 via the communication unit 20.
- 25 If, on the other hand, the ID is registered for an initiated parking, step 206 is implemented. Here the payment terminal registers the termination time for parking, and stores information concerning the duration of parking. Thereafter, in step 207, the payment centre sends a confirmation to the vehicle terminal 2 via the communication unit 20 that the termination of  
30 parking has been registered. In step 208 the vehicle terminal then terminates its indication that parking is registered. This is implemented by the fact that the indicator lamp is turned off or the display no longer displays the registration code mentioned in step 107 on the display 13. The established connections are then disconnected.

As an alternative to the embodiment of the method for initiating parking which has already been described, the user can initiate parking by means of the actual communication unit 20, which will preferably be a mobile telephone, as will be assumed in the following description. In this  
5 embodiment some of the functions are moved from the vehicle terminal 2 to the mobile telephone 20, and the vehicle terminal acts principally as a display unit for indicating that parking has been registered. The mobile telephone 20 will have instructions for a parking application stored in its memory, preferably in a so-called SIM card. This application is activated by  
10 the user, who also if necessary prepares for establishment of a connection between the mobile telephone 20 and the vehicle terminal 2. The mobile telephone calls the payment centre 3 and transfers a registration signal to the payment centre 3 as already described. It should be noted that in this case the user identity and any other data which are to be included in the registration  
15 signal will be stored in the mobile telephone's SIM card, and not in the vehicle terminal 2. When the mobile telephone 20 receives confirmation from the payment centre 3, a connection is established between the mobile telephone 20 and the vehicle terminal 2 via their communication ports (physical, infrared, Bluetooth or the like), corresponding to that which is  
20 described above. As soon as the vehicle terminal 2 is active and a connection between it and the mobile telephone 20 has been established, the code which is received from the payment centre 3 is transferred to the vehicle terminal, and the established connections are disconnected. The vehicle terminal 2 will then indicate that parking has been registered as described above.

25 In a similar alternative method for termination of parking, the user can reactivate the parking application in the mobile telephone 20. A connection is then re-established between the vehicle terminal 2 and the mobile telephone 20. The parking application will then request the registration code concerned, and after receiving it, both it and any identity code will be transferred to the  
30 payment centre 3. The vehicle terminal 2 will then terminate the indication of registered parking, the payment centre 3 will send a confirmation that parking is terminated (or an error message if no parking agreeing with the received data has been registered), and as soon as the parking application in the mobile telephone has received the confirmation from the payment centre  
35 3, the established connections are disconnected and the parking application is deactivated.

In an alternative embodiment of the invention the vehicle terminal 2 is designed in such a manner that in addition to the registration signal it emits a signal which is received by a transmitter/receiver connected to a control device for a barrier (not shown) which controls access to an outdoor or indoor car park or the like. This signal may be a signal which is independent of the registration signal, with the result that the vehicle terminal 2 also acts as an ordinary remote control unit for the barrier. It may be the actual registration signal which is transmitted from the vehicle terminal 2, and received by said receiver. In the former case the control device will investigate whether the remotely controlled signal is a valid signal. There are a number of ways of designing such remote control and access control systems that are known per se, and this design in itself should not be regarded as a part of the invention. It will therefore not be described further. In the latter case the registration signal which is received by the receiver will be retransmitted from this receiver to the payment centre 3. On the basis of the identity which is indicated in the registration signal, the control unit can then either investigate in a thereto connected database whether the vehicle terminal 2 has legal access to the car park, or it gives access to the car park on receipt of a confirmation from the payment centre 2 that parking has been registered. A similar arrangement when driving out of car park or parking garage will make it possible to ensure that the payment centre receives a message that parking has been terminated. A variant of this last alternative will be designed so that the vehicle terminal 2 in the manner already described transmits the registration signal directly to the payment centre 3, with the payment centre 3 thereupon transmitting a signal to the control unit indicating that the barrier should be opened.

In a further modified embodiment of the vehicle terminal 3 it is capable of storing historical data, thus providing the user with his own register for subsequent checking. Thus the user can at all times have historical data shown on the display 13 by pressing a key for indication of status.

The system may be further developed by giving car parks which are controlled by private parking companies unique numbers for identification. In this case, instead of indicating parking area the user will key in the identification number of the car park concerned, or of the security firm or parking company involved. The payment centre 3 will then need to have the "price list" of the participating parking companies. Confirmation that a valid

identification number has been given for the car park can be provided via the display 13, or by means of the indicator lamp 12 which indicates valid registration of parking.

- 5 The invention can be adapted to a great many requirements. A preferred embodiment is based on the use of modern telecommunication such as, for example, GSM, but it is also possible to implement simplified versions which utilise only radio communication over smaller geographical areas. In its preferred embodiment it will be possible to develop the system so as to gradually replace present day ticket machines, thus providing major
- 10 advantages and savings for users and parking companies. It will permit parking without the use of coins, the parking period will be regularly invoiced through the teleoperator's or a parking company's administrative system, controls can be implemented quickly and easily and no collecting equipment is required.
- 15 The system is further designed so that all public and private parking companies can join the system, and all towns which have GSM coverage, or are covered by a corresponding mobile telephone system, will be able to use the system in its fully developed form - adapted to zonal parking regulations in the individual town.

## PATENT CLAIMS

1. A method for registering parking in pay car parks, wherein parking is registered in a payment centre in that a registration signal which at least comprises an identification signal for the vehicle or a user of the vehicle is transmitted to a payment centre,

characterized in that each vehicle which uses the system is equipped with a vehicle terminal which at the beginning of the parking period transmits said registration signal to said payment terminal, and that the registration signal also may contain information concerning the duration of the parking period,

that the payment centre registers the identification signal, starts a time registration associated with the identity indicated by the identification signal or possibly registers the duration of the parking period if such information is included in the registration signal, and returns a confirmation to the vehicle terminal that parking has been registered,

that the vehicle terminal indicates that parking has been registered and said confirmation is received, in the form of a first indicator which may be an indicator lamp, and

that at the termination of the parking period the vehicle terminal transmits a new signal to the payment centre which terminates the time registration associated with said indicated identity, or, if the parking time was indicated in the first registration signal, that after the expiry of this period the vehicle terminal terminates the said indication that parking has been registered.

2. A method according to claim 1,

characterized in that the payment centre administers a plurality of car parks or areas, and that the registration signal which is transferred from the vehicle terminal at the beginning of the parking period also includes a code which identifies the car park or parking area in question.

3. A method according to claim 2,

characterized in that the identification code of the car park or parking area is entered manually by the user of the vehicle terminal.

4. A method according to claim 2,

characterized in that the identification code of the car park or parking area is broadcast locally in the car park, for example by means of a radio



transmitter, thus enabling it to be received by the vehicle terminal and transmitted on to the payment centre upon registration.

5. A method according to claim 2, characterized in that the vehicle terminal is equipped with a GPS receiver for position determination, and that information on this position determination is transferred to the payment centre as the code which identifies car park or parking area.

6. A method according to one of the preceding claims, characterized in that the vehicle terminal is designed in such a manner that the driver of the vehicle which is to be parked manually activates calling at the beginning and end of the parking period.

7. A method according to one of the preceding claims, characterized in that at the beginning of the parking period the driver of the vehicle which is to be parked indicates the duration of parking, thus enabling this to be stored in the vehicle terminal and/or in the payment centre.

8. A method according to one of the preceding claims, characterized in that the time registration which is started by the payment centre is a timer in the vehicle terminal which starts when the latter receives the confirmation signal from the payment centre, this clock being stopped and read by the payment centre when the parking is terminated.

9. A method according to one of the preceding claims, characterized in that the registration signal from the vehicle terminal to the payment centre, or signals derived therefrom, are also transmitted to a station which controls a gate or another form of access control to the car park, with the result that access to the car park is only possible after parking has been legally registered in the payment centre and optionally that it will only be possible to leave the car park after the registration of parking has been terminated in the payment centre, or that the station checks in a thereto connected database whether the identity indicated by the vehicle terminal gives legal access to the car park.

10. A parking system for registering parking in a pay car park, comprising at least a payment centre equipped for receiving and recording signals which at least indicate the beginning of a parking period and the identity of a

vehicle or a user of the vehicle,  
characterized in that it further consists of a plurality of vehicle terminals,  
where

each vehicle terminal comprises means for transferring a registration  
5 signal to a payment centre, an indicator for disclosing whether parking has  
been registered or not and means for storing for each vehicle terminal a  
unique identification code which is transferred to the payment centre as a  
part of the registration signal, and where

the payment centre comprises equipment for receiving registration  
10 signals from vehicle terminals, equipment for starting a time registration  
associated with a received identification code when a first registration signal  
is received or possibly recording the duration of the parking period if  
information thereon is included in the registration signal, and terminating  
15 said time registration when a second registration signal with the same  
identification code is received, together with equipment for returning  
confirmation signals to the vehicle terminal every time a registration signal is  
received and time registration begins or ends.

11. A parking system according to claim 10,  
characterized in that the means in the vehicle terminals and payment terminal  
20 for transferring signals are radio transmitters.

12. A parking system according to claim 10,  
characterized in that the means in the vehicle terminals for transferring  
signals are mobile telephones, for example GSM telephones, and that the  
payment centre is connected to the public telecommunications network.

13. A parking system according to claim 10,  
characterized in that the means in the vehicle terminals for transferring  
signals are communication ports or infrared transmitters/receivers, whereby  
the vehicle terminals can be connected to communication units, for example  
mobile telephones, such as GSM telephones, and that the payment centre is  
30 connected to the public telecommunications network or a transmitter/receiver  
which can communicate with said communication units.

14. A parking system according to claim 12 or 13,  
characterized in that the payment centre is equipped to be capable of

employing information from the mobile telephone network for registering from which geographical area the registration signal comes.

5 15. A parking system according to one of the claims 10 to 14, characterized in that the vehicle terminal is equipped with a receiver which can receive local signals at a given car park, where said signals identify the car park, thus enabling information on its identity to be transferred to the payment centre together with the registration signal.

10 16. A parking system according to one of the claims 10 to 14, characterized in that the vehicle terminals are equipped with GPS receivers which can determine the vehicle's position, this position being transferred to the payment terminal together with the registration signal.

15 17. A parking system according to one of the claims 10 to 16, characterized in that the vehicle terminal includes a display which can indicate which parking area has been registered, and/or the length of time since parking was registered.

18. A parking system according to one of the claims 10 to 17, characterized in that the vehicle terminal includes a unit which can store historical data for which parking has been registered, and these historical data can be exhibited on the terminal's display.

20 19. A parking system according to one of the claims 10 to 17, characterized in that the vehicle terminal and/or the payment centre include equipment for communicating with a control device which controls a barrier or similar access control means to the car park, this control device being designed only to provide access to the car park after parking has been  
25 registered in the payment centre, or after an investigation has been performed in a thereto connected database as to whether the vehicle terminal indicates an identity which gives access to the car park.

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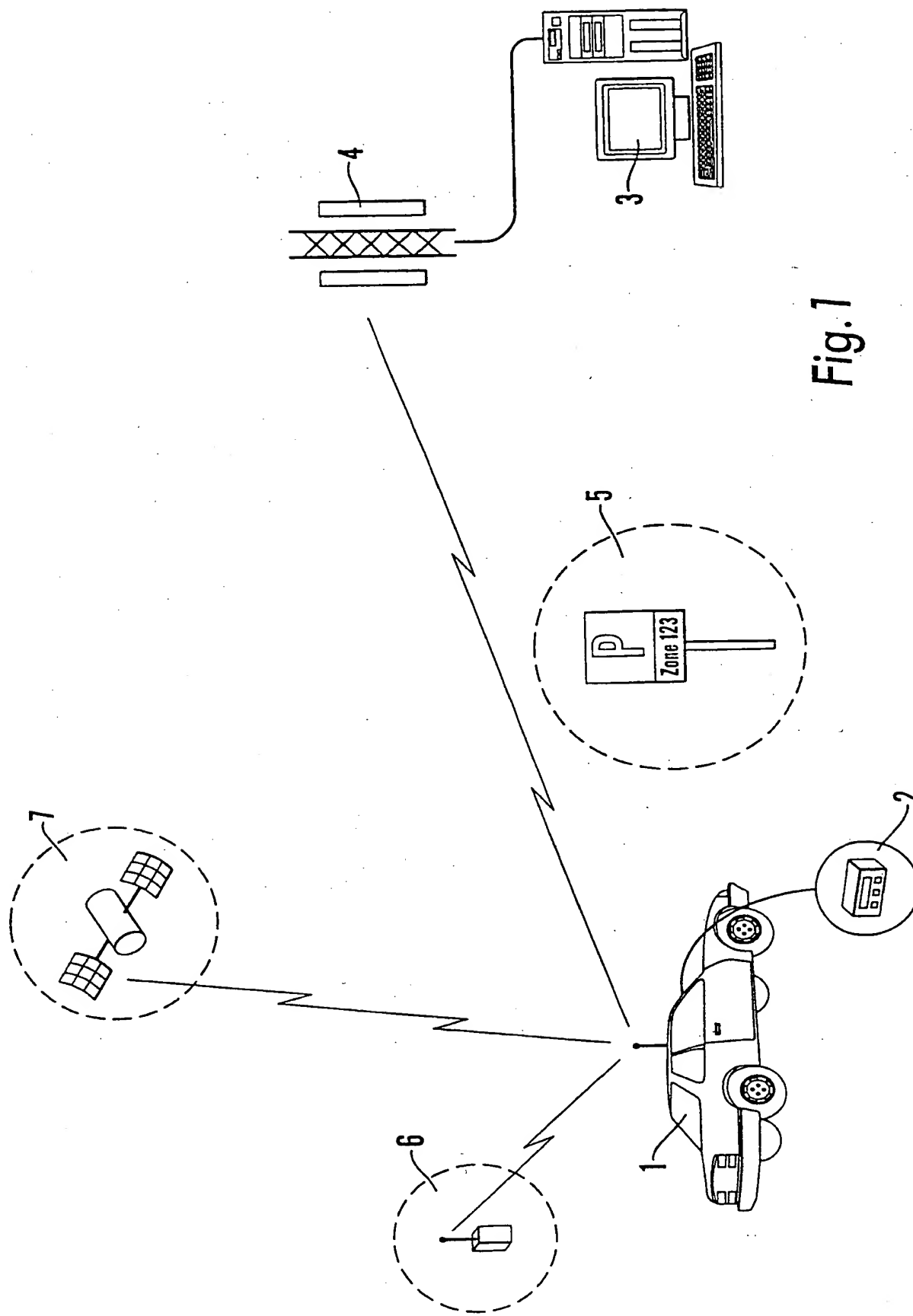


Fig. 1

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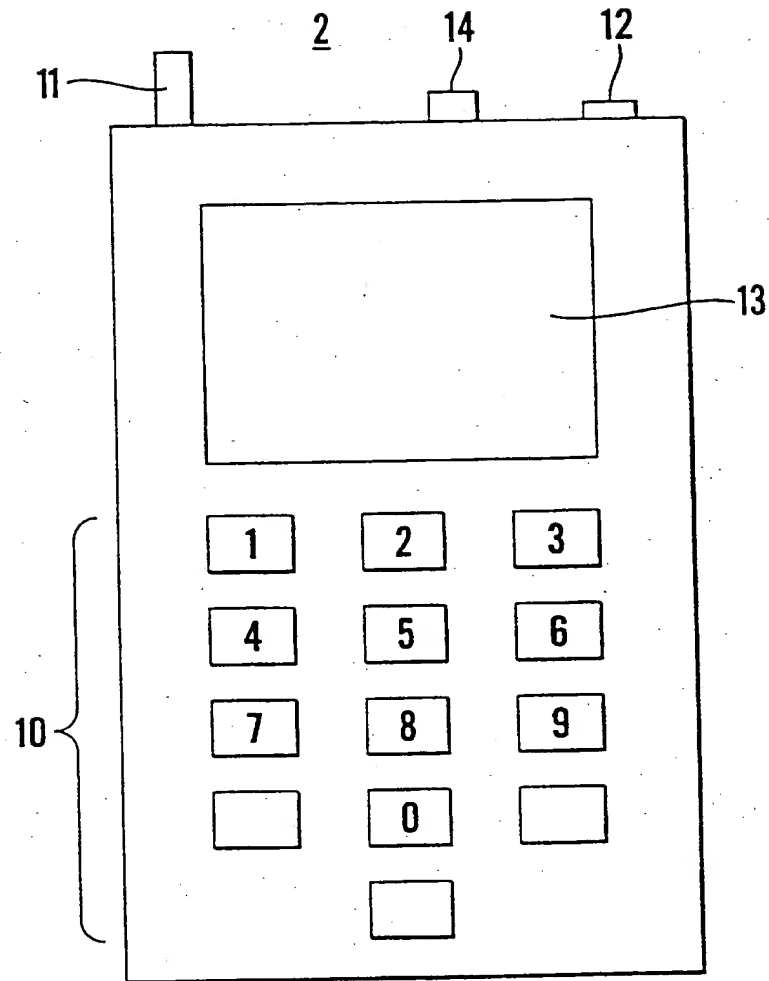


Fig.2

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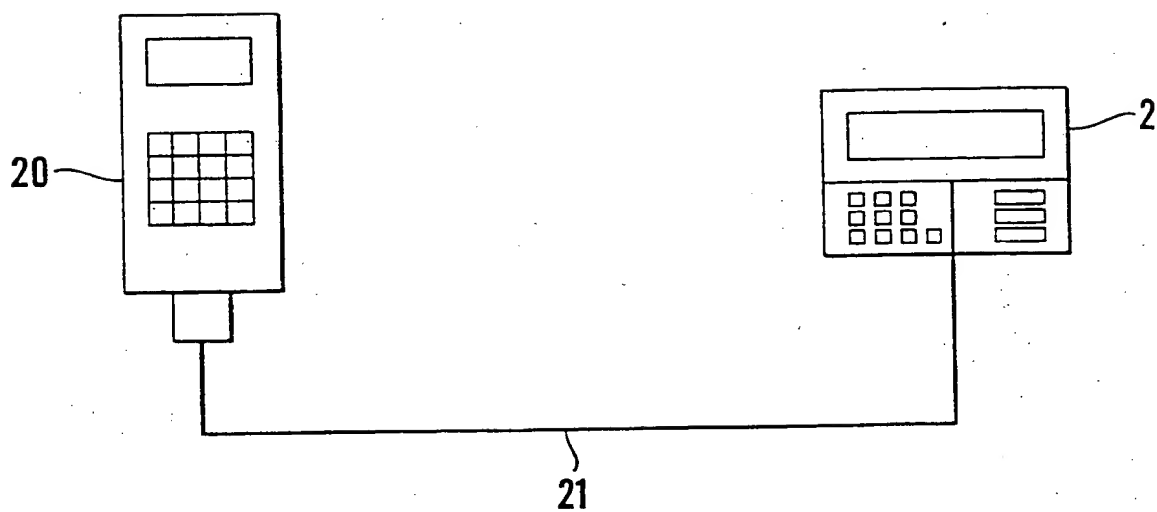


Fig. 3a

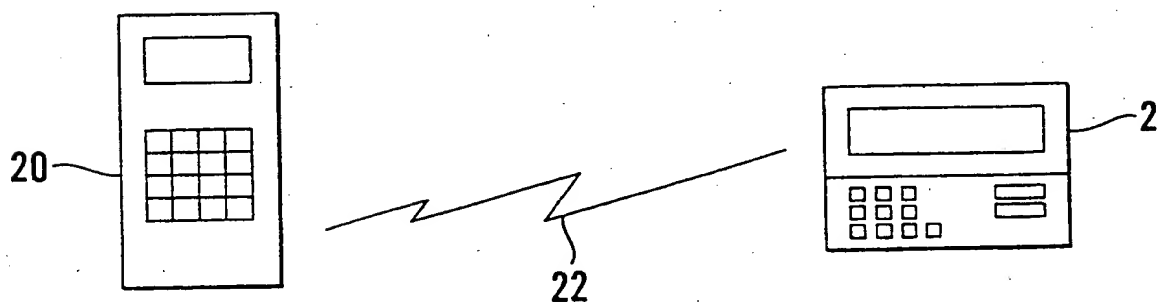


Fig. 3b

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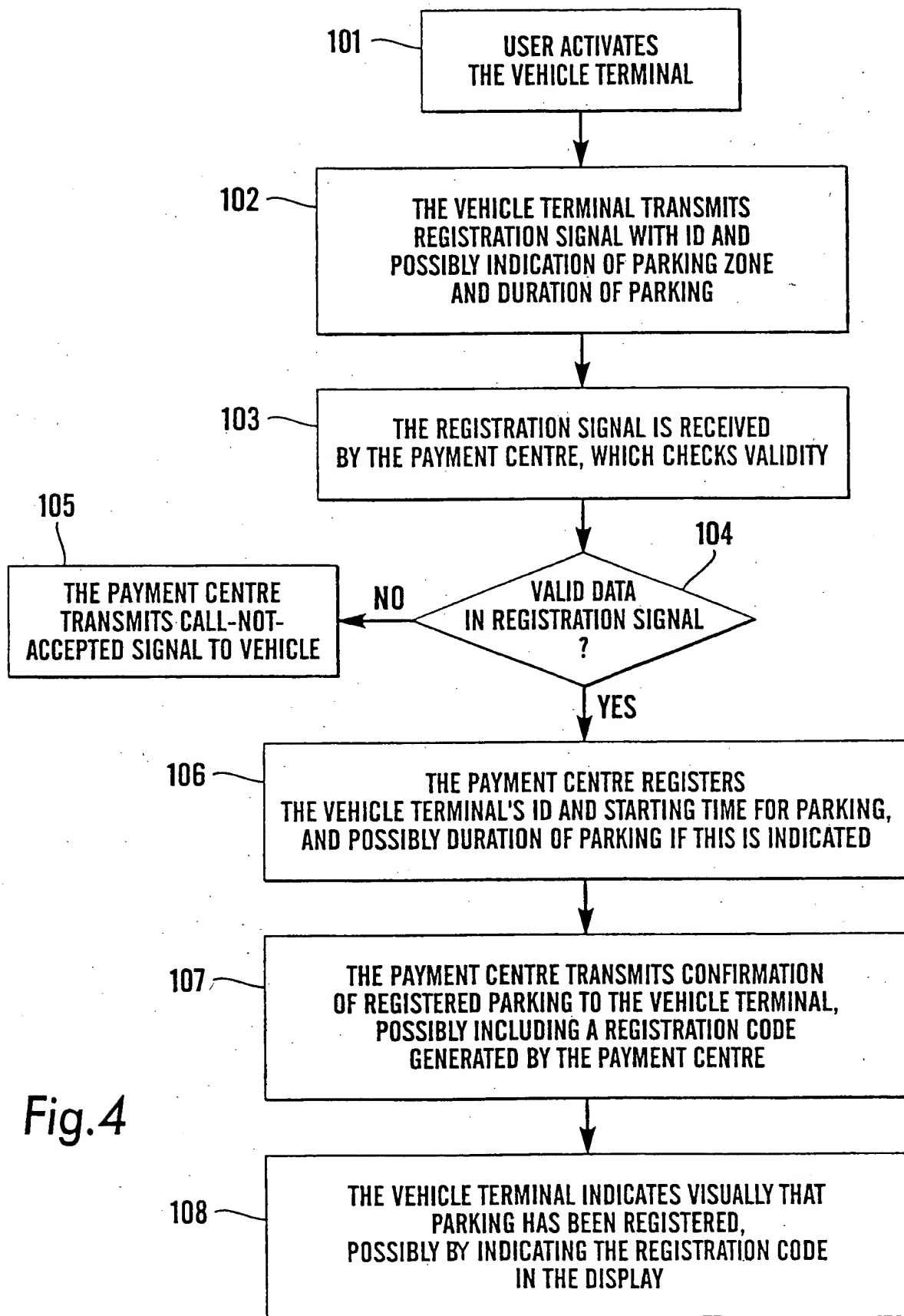


Fig.4

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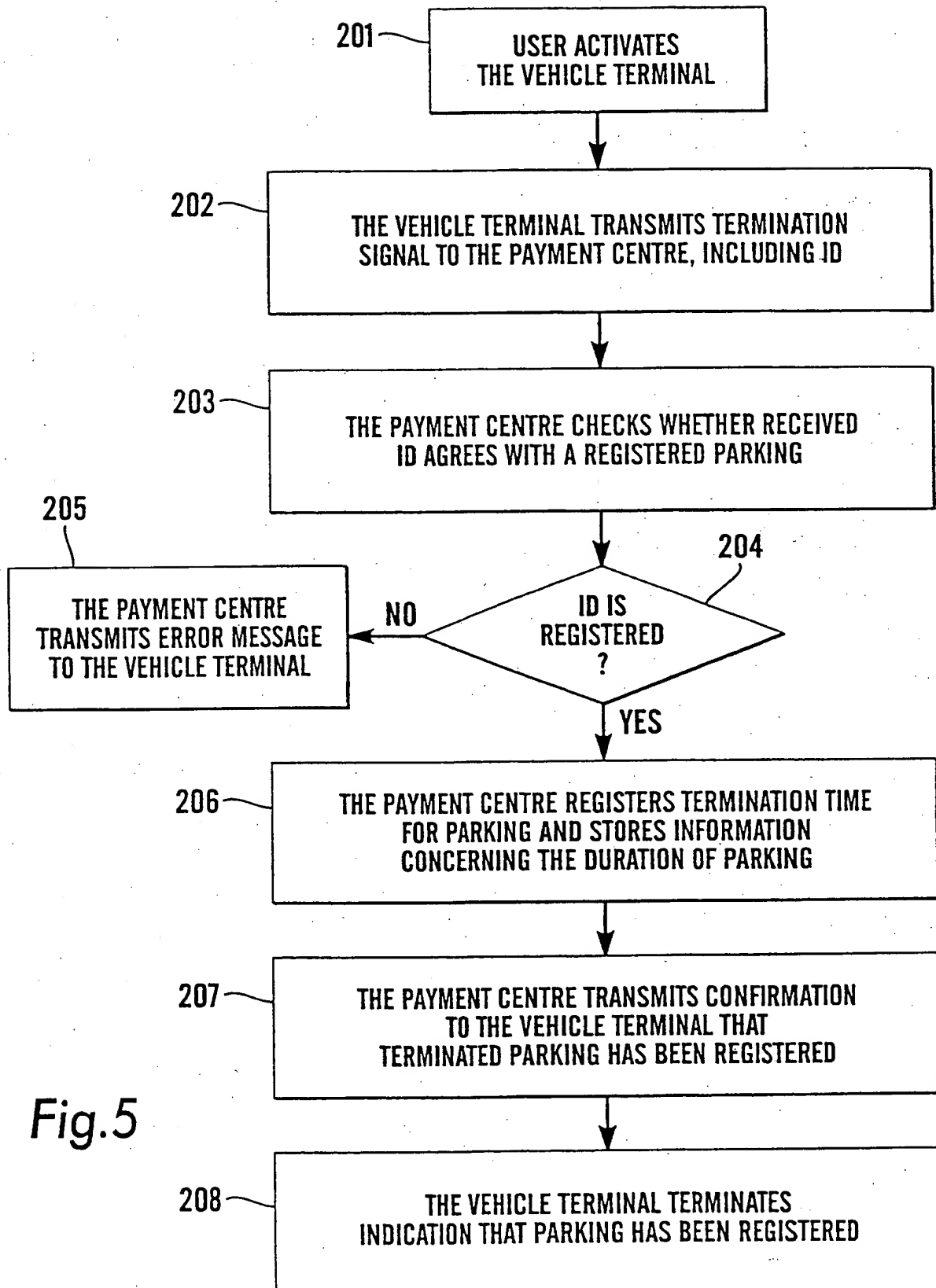


Fig.5



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/NO 99/00261

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7: G07B 15/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: G07B, G07C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 9407206 A1 (AT/COMM INCORPORATED), 31 March 1994 (31.03.94), page 7, line 32 - page 10, line 23, figures 1,2 --	1-19
A	US 5737710 A (ROBERT B. ANTHONYSON), 7 April 1998 (07.04.98), figure 1, abstract --	1-19
A	US 5796084 A (LARS OLSSON), 18 August 1998 (18.08.98), figure 1, abstract --	1-19
A	WO 9804080 A1 (ZEITMAN, SHLOMO), 29 January 1998 (29.01.98), figure 1, abstract --	1-19

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

## \* Special categories of cited documents

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Date of the actual completion of the international search

Date of mailing of the international search report

17 December 1999

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# INTERNATIONAL SEARCH REPORT

International application No.

PCT/NO 99/00261

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>GB 2295476 A (AZTECH SYSTEMS LIMITED), 29 May 1996 (29.05.96), abstract</p> <p style="text-align: center;">-- -----</p>	1-19

# INTERNATIONAL SEARCH REPORT

Information on patent family members

02/12/99

International application No.

PCT/NO 99/00261

Patent document cited in search report			Publication date	Patent family member(s)		Publication date
WO	9407206	A1	31/03/94	AU	5128293 A	12/04/94
				US	5751973 A	12/05/98
-----						
US	5737710	A	07/04/98	NONE		
-----						
US	5796084	A	18/08/98	AT	169758 T	15/08/98
				AU	691524 B	21/05/98
				AU	7712994 A	03/04/95
				BR	9407635 A	28/01/97
				CA	2171946 A	23/03/95
				CN	1131470 A	18/09/96
				DE	69412496 D,T	24/12/98
				EP	0719437 A,B	03/07/96
				SE	0719437 T3	
				ES	2122330 T	16/12/98
				FI	961189 A	14/03/96
				JP	9502820 T	18/03/97
				NO	961068 A	15/03/96
				SE	9303025 A	17/03/95
				SG	48020 A	17/04/98
				WO	9508162 A	23/03/95
				SE	9400850 D	00/00/00
-----						
WO	9804080	A1	29/01/98	AU	3271997 A	10/02/98
				CA	2260925 A	29/01/98
				IL	118898 D	00/00/00
				US	5940481 A	17/08/99
-----						
GB	2295476	A	29/05/96	GB	9423546 D	00/00/00
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